An insulating substrate 1 is comprised, for instance, of aluminum oxide or a mixture of aluminum hydroxide and so on, and as shown in a slanted view of FIG. 1B, the channel 2 in which an electron multiplier surface 3 is formed on the internal surface of the pore 6 extending through the substrate is placed, and the insulating substrate 1 is formed to be approximately several hundreds μm to 1 mm thick, and to have the diameter of 10 cm for instance in order to form a multi-channel plate.

The channel 2 has a diameter of several μm to several hundreds μm or so, and a million pieces or more of it are formed, for instance, in order to form the multi-channel plate for an image intensifier.

Moreover, the pores of the porous element may be formed substantially in a vertical direction from a top electrode 4 to a bottom electrode 5.

In addition, as shown in FIG. 3, the pores may be formed in a slanted direction to a thickness direction of the substrate so as to increase the number of the times that the electron collides with the pore wall surface. Or, it is also possible to render the pore diameter on the top face of the porous element different from that on the bottom face.

FIG. 2 is an enlarged section view of a single channel comprising the multi-channel plate in FIGS. 1A and 1B. The internal wall surface of the pore 6 of

each channel 2 is the electron multiplier surface 3, and the inside of the channel 2 is a hole. There are the asperities on the face of the electron multiplier surface 3, and formation of the asperities can dramatically enhance a nucleus occurrence density so as to improve the secondary electron multiplication factor.

It is easy to form a surface that is uneven with irregular asperities on the electron multiplier surface 3. For instance, as the pore that is the electron multiplier surface 3 has a grain 3a of an oxide or the like on its internal wall surface, it increases microscopic asperities on the face of the electron multiplier surface and the surface area thereof becomes larger than an even surface so that a secondary electron multiplication factor can be further improved.

The cathode electrode 4 and the anode electrode 5 are intended to apply a potential to the electron multiplier surface 3, and they are form with metals such as Au/Ti and Al to be approximately 0.1 to 0.5 μm thick.

The electrodes do not have to be formed in the entire area of the top and bottom faces of the porous element but only in part thereof.

The channel plate of the present invention has the channel including aluminum formed by regularized Al anodic oxidation.

The manufacturing method of the channel plate shown in FIGS. 1A and 1B will be described by referring to FIGS. 4A to 4D.

First, as shown in FIG. 4A, a substrate 10 of which main ingredient is Al that is the material of the insulating substrate 1 is soaked in an electrolyte for anodic oxidation to form the pore 6 as shown in FIG. 4B.

Here, the substrate of which main ingredient is Al is the material forming the pore by anodic oxidation and having a portion in which the metal Al is constituted with required area and thickness, where a metal Al plate and a board forming electrodes having an Al film piled up thereon and so on can be named. Moreover, other elements may be included as far as they can be anodized. In addition, a vacuum evaporation method by resistance heating, a sputtering method, a CVD method and so on may be used to form the aluminum film. However, a method capable of forming a film with a surface that is even to an extent is desirable.

The electrolyte is liquid for forming the pore while oxidizing the metal Al by applying desired voltage, for which an aqueous solution of phosphoric acid, oxalic acid, sulfuric acid and so on adjusted to a desired density is used. The spacing, depth and so on of the pores can be changed by controlling a current density and time. In the case of a pore forming method